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United States Department of Agriculture,

OFFICE OF EXPERIMENT STATIONS—Circular 71.

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REPORT OF COMMITTEE ON EXPERIMENT STATION ORGANIZATION AND POLICY.¹

When the standing committee on station organization and policy was appointed at the Washington meeting a year ago there seemed little work for the committee to do, and it was decided best not to force work, but allow matters to develop and take up such questions as might from time to time arise.

I. THE ADAMS ACT.

In March when the passage of the Adams bill seemed to be assured, Director True, of the Office of Experiment Stations, wrote the chairman of the committee that a number of questions as to the policy of stations in the expenditure and use of this new fund would be much discussed in the near future, and on some of these matters the Office of Experiment Stations would have to take action as representing the Secretary of Agriculture in the administration of the Adams Act. He suggested, therefore, that the committee be called together to take such action as might seem desirable. Accordingly, a meeting of the committee was held at the Auditorium Hotel, Chicago, April 7. Directors Davenport, Scovell, Thorne, and Woods, of the committee; Dr. Babcock (representing Director Henry) and Director True and Assistant Director Allen, of the Office of Experiment Stations, were present—the last three on invitation of the committee.

The committee found itself in accord with the Office of Experiment Stations in regard to the general scope of investigations that can properly be undertaken under the Adams Act. There has been during the year the most cordial relation and a very complete understanding between the committee and the Office of Experiment Stations in regard to the policy to be pursued, and the committee heartily indorses the letters and circulars of the Office relative to the Adams Act.

Among the problems under consideration by the committee are—

(1) How can necessary duplication of work be avoided?

(2) How can continuity of effort be better insured, and rapid changes in station officers be avoided?

¹Presented to the Association of American Agricultural Colleges and Experiment Stations at the convention held at Baton Rouge, La., November 14–16, 1906.

(3) What are suitable lines of investigations to be taken up under the Adams Act?

To gain as much light as possible on these and similar points, the following letter was sent to the directors of the various stations:

"The committee on station organization and policy desires to collect information upon the following topics:

"(1) The character of experiments that ought to be undertaken under the Adams Act.

"(2) How to prevent undue competition (between stations) so far as men are concerned.

"(3) How to best reach boards of control.

"(4) What influence can be exerted to prevent sweeping and disastrous changes in station organization?

"(5) The relation of the work of the United States Department of Agriculture to that of the stations."

A large number of replies were received and have been carefully considered by the committee at numerous meetings held at Baton Rouge before and during this session of the Association. At the request of the committee, Doctors True and Allen have met with and greatly assisted the committee in their labors.

It speedily became evident that it will of necessity be a matter of years before a perfectly satisfactory working out of the relations of the station to the Adams Act can be accomplished.

The local conditions surrounding the stations, both as to environment and personnel, make it impossible to hope that at the beginning it will be always possible for a station to take up lines of investigation of the high type it is hoped that all the stations may ultimately attain.

Even at the risk of wearying the Association it seems wise to outline as briefly as may be some of the difficulties found in the way of clearly defining the relations of the station to the Adams Act.

In the abstract everybody agrees with the purpose of the Adams Act and the desirability of restricting the fund closely to original investigations. When we come to concrete cases, however, there is a very great difference of opinion. It must be said that there are indications of a certain unreadiness for research of the true type. The difficulty is in a sense a fundamental one, but grows to a considerable extent out of a habit of mind. Many of our station workers see only the immediate duty of the station to the local farmer of to-day. They forget that the station has a duty to all phases of agriculture in a broad sense, in order that its labors may lead to much more permanent and widespread benefit.

The greatest difficulties at the present time, as disclosed by conversation and correspondence with experiment station men, are (1) a lack of clear discrimination between investigation in a strict sense and ordinary experimental work; (2) a lack of definiteness in the purposes

and plan of the investigations; (3) a tendency to take up too large or broad problems; and (4) the outlining of too large a number of projects.

As indicating the first difficulty, take the milking machine for example. At least a dozen stations have purchased milking machines, or plan to do so, with a view to making what they designate as investigations of the use of that machine. In several cases the plan of work as outlined merely contemplates the comparison of the machine with hand milking as regards yield of milk, composition, and cost of operation. In several other cases the effect of machine milking on the bacterial content and general sanitary condition of the milk is included, and in at least one other case the investigation is extended to different types of machines and is to include the mechanical construction and the effect of continued use upon the cow.

Obviously a great deal will depend in this line of work upon the mental attitude and ideals of the man in charge of it. It may easily degenerate into something quite analogous to the tests of separators and other dairy machinery which were so popular a few years ago and which, useful as they were, could hardly be regarded as investigations or research.

Perhaps more projects have been proposed in plant breeding than in any other subject, and these are of great variety. They may be classed somewhat roughly as follows: (1) Those which aim at "improvement" in a vague and indefinite way; (2) those which propose improvement and adaptation along rather more definite lines by means of selection, these selections to be made from the crops grown under field conditions, the poorer groups being eliminated rather than the superior individuals selected; (3) systematic breeding and selection, starting from the individual, according to the method used by Professor Hays at the Minnesota Station; (4) breeding or selection for resistance to disease, insect attacks, hardiness, etc., in which individuals are selected here and there and the attempt made to perpetuate the desirable traits and at the same time to keep up the general quality by crossing with approved varieties; (5) improvement through crossing and hybridizing, to be followed by systematic and rigorous selection; and (6) breeding experiments undertaken primarily to test the application of recognized theories, to study correlations of vegetative parts with certain qualities, and to secure a basis for generalizations on the principles of breeding.

These different classes manifestly differ widely in their character and their value, from a scientific standpoint. What classes of this work should be properly regarded as investigation, and where should the line be drawn between the work of the plant breeder as an expert on the one hand and that of the seedsman and nurseryman on the other? The stations have shown the possibility of improvement along lines which were not thought feasible, have produced a considerable number of

valuable strains of varieties, and have contributed toward the methods in this line of work. The question arises, Should they go on improving and adapting our common field crops to local conditions and special purposes, and regard this as scientific investigation; or should these specific improvements be left to the commercial man and the more intelligent farmer, while the station devotes itself to some of the more difficult phases of breeding, and to trying to develop some of the principles and fundamentals which will be of broad application and will tend to make our breeding more sure and less hit or miss than at present?

In feeding we find (1) experiments proposed which in themselves amount merely to the ordinary comparison of different foods and rations, in short-period experiments, and upon that indefinite thing designated the management and handling of feeding stock; (2) isolated digestion experiments made merely to add to our fund of data; (3) experiments to study the effect on digestibility and the utilization of the food, of certain specific feeding stuffs, and the combinations of different classes of feeds; (4) experiments made in connection with analytical studies and digestion experiments, to study the nutritive values of various feeds, the animal being the measure in such cases; (5) studies of the specific effects of different kinds of feeds, as certain grains and by-products, upon the qualities of milk and dairy products, the limit of cotton-seed-meal feeding to pigs; and (6) studies of the effects and functions of particular constituents, as the ash and the protein, the protein requirement, metabolism of nutrients, and the theory of animal nutrition in general.

Instances might be multiplied and extended to all branches of agriculture which show a great difference of opinion as to what constitutes research, and mark every gradation from isolated experiments of purely practical import, to investigations of the most abstract character. They indicate that the subject needs careful and detailed study and can not be disposed of offhand. One difficulty lies in the complex character of our agricultural problems. They have not been subdivided and classified as in the case of the pure sciences, and in many cases our work is inconclusive and does not bring our knowledge up to a definite point or stage. In a sense it has been unsystematic, leaving our knowledge so fragmentary that there is often difficulty in determining whether a given topic is an original one or not.

At the present time your committee finds it impracticable to lay down specific lines along which the Adams fund may be properly expended, and limits its recommendations to those of a general nature, leaving the more detailed statements to a later time.

Perhaps the following statement, adopted at the Chicago meeting, sets forth the ideas of the committee as tersely and clearly as is at present possible:

It is evidently the intention of the Adams Act to provide the means

for carrying on investigations of a relatively high order with a view to the discovering of principles and the solution of the more difficult and fundamental problems of agriculture. To this end it is very desirable that careful attention shall be given to the choice of definite problems to be studied and the methods by which the solution of these problems is to be sought. Investigations in connection with which there is good reason to expect the establishment of principles of broad application should be preferred to those which have only local or temporary importance or from which only superficial results are to be obtained.

The ideal college should be symmetrical, in that it is equally developed in all lines. A station need not be symmetrical. One or two strong departments are better than many weak departments. In selecting the lines of work due reference should be given to the special needs of the State in which the station is located, but the lines of work adopted should be only such as have a reasonable expectation of leading to the establishment of principles of broad application. These lines of work need not be new lines. Indeed, strengthening lines of investigations now in progress may be fully as important as the establishment of new lines.

At the present time we must confine ourselves to general principles in selecting the line of research to be taken up under the Adams Act.

To be sure that these lines are in the scope of the Adams Act, it will be necessary for the station administration to clearly understand what constitutes research.

Only a few lines can be advantageously undertaken at a time. What these lines of investigation shall be must be determined chiefly by the equipment of the station in men and facilities.

The man is the most important factor. If the station already has the man, the line of investigation must be one to which he is adapted by mental aptitude, education, and training.

If the station is to employ a new man, a wider range in choice of subjects might be possible. But in any case the man and his line of work must be suitable to each other. In the search for men it may not always be possible to find men among the graduates of the land-grant colleges of broad enough training to make ideal investigations. It is more important that a man be thoroughly educated in the fundamentals of science than that he be trained in some of its applications. For example, if a station is to investigate problems in soil physics it is more important that the man be well educated in the fundamentals of physics than that he should have had a course in agricultural physics such as is usually taught in agricultural colleges. This follows from the fact that the thoroughly trained physicist can speedily acquire the known facts in soil physics, while the man merely trained in soil physics hopelessly lacks the basal knowledge of the science.

After suitable lines of work are decided upon, all payments for salary

and labor and purchase of apparatus, tools, books, and other material necessary to carry out this problem are allowable.

II. ORGANIZATION.

In view of experiences not unknown in the past and likely to be repeated from time to time in the future, your committee feels it not unwise to call attention to certain fundamentals in organization that seem sometimes to be forgotten or overlooked, but that bear with irresistible force upon the efficiency of experiment stations as agencies for research.

(1) Regarding the relation between boards of trustees and station officers: The function of boards of trustees is legislative, while that of station officers is executive. Boards adopt plans and station officers carry them out. These two functions are mutually exclusive and do not overlap. If proper distinctions are kept in mind as to the fundamental difference between ordering a thing done at public expense, which is a legislative act, and the carrying out of that order, which is an executive act—if this distinction be kept in mind, there need be no confusion as to mutual responsibilities and duties on the part of station officers and boards of trustees.

Manifestly the determination of a new policy of wide and general application or the fixing of a new principle of procedure is a deliberative act which nobody but a board of trustees is competent to undertake. On the other hand, to carry out a plan or policy to a successful issue—to meet and handle all details and to use them to that end—these are executive acts for which only executive officers are competent.

The committee is of the opinion that failure to observe this fundamental distinction is the frequent occasion for station officers proceeding with insufficient authority on the one hand, and upon the other of attempts on the part of the boards of trustees or of their members to become involved in administrative details that belong only to station officers. The first is certain to lead to censure if not ultimately to sudden and sweeping removals; the second makes the position of station officers intolerable. Your committee is clear upon this point, viz, that any confusion as to mutual responsibilities and duties as between boards of trustees and their employees is fatal, not only to efficiency of service, but ultimately to the organization itself.

(2) Regarding the source of authority: The authority of an officer, whether legislative or executive, arises out of the nature of his responsibilities, and the imposing of that responsibility by any competent body carries with it sufficient authority for all acts necessary to its discharge. But no officer is competent to act except within regularly constituted channels. For example, a director has no right to assume the duties of a subordinate. In the discharge of his duties he must act as a director, not as another officer. Similarly, an individual who is a

member of a board of trustees is competent to discharge his functions only in regular session. The authority of the board resides in the body as a whole, and not in its individual members, unless they have been directed to act for that body in a special matter. All this is aside from the fact that it is not only important but necessary to intelligent performance of their duties that members of boards of trustees familiarize themselves with the details of station work and needs.

(3) Propriety in relation between employer and employed: It is manifestly inconsistent for the same individual to hold an administrative position in a station and at the same time be a member of the board of trustees. It not only establishes the absurd situation of a man enacting the laws under which he himself shall afterwards serve in a public capacity, but it undermines that feeling of confidence and personal security on the part of his associates that is known to be necessary to good and efficient service.

(4) Tenure of office: Reasonable security of position, at least among men who have now a fair right to honorable standing among their fellows—all this is so manifestly essential to even fair efficiency that your committee ventures to express the conviction that to subject faithful station officers to the ordeal of annual reappointment is not only unnecessary to the securing of efficient service, but it is disturbing to individuals, tends to prevent the formation of plans and policies looking to the highest stability, and is positively dangerous to the integrity of the organization.

The committee is in possession of a mass of material bearing upon a variety of questions of more or less personal interest and which it reserves for future report, mentioning at this time only the matters that seem of most importance at the moment.

All of which is respectfully submitted.

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Recommended for publication.

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Publication authorized.

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